ASTC Dimensions

Bimonthly News Journal of the Association of Science-Technology Centers

March/April 2004

VISITOR-CENTERED SPACES:

HOW PHYSICAL CONTEXT AFFECTS EXPERIENCE

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IN THIS ISSUE

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That physical surroundings have a profound impact on our mental and emotional well-being is not a new insight. Nor is it innovative to apply that insight to the organization of museum spaces. In his 1987 *Museum Visitor Evaluation: New Tool for Management,* Ross J. Loomis counseled managers to pay close attention to wayfinding and develop "a master plan that anticipates human needs from the time visitors enter the museum until they leave." But with so many science centers and museums currently embarking on major building programs, expansions and renovations, it seems appropriate to revisit the connection between physical context and the visitor experience.

Features

Departments

Cover: *Connecting the Science Museum of Minnesota to its St. Paul site, the dramatic glass-enclosed River Stair—an extension of the building's free public areas—spirals from the lobby down to the Mississippi riverfront. The staircase offers its users an additional surprise: Sensors along the steps detect foot movement and trigger harmonious musical tones.* Photo by Timothy Hursley

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Designed For, Not By:

The Visitor-Centered Environment

By Jeanne Vergeront

PEOPLE-FRIENDLY SPACES—Visitors entering the atrium at New York's Rochester Museum & Science Center (left) can quickly orient themselves to the museum's amenities. Lower ceilings, defined areas, and borrowed light in the Collections Gallery at the Science Museum of Minnesota (above) create an intimate space for inquiry. *Photos courtesy RMSC and SMM*

You may have read an article recently about a new museum building, wing, or renovation. The piece probably began something like this, "Designed by [*name of architect*], creator of [*list of architect's previous achievements*]...," followed by a description of the structure, materials, and site.

Imagine if, instead, the article began this way, "Designed for hands-on learning, the new museum...," and went on to describe how a consortium of planners had organized the structure around such principles as coherent layout, minimized distractions, and good sound control.

Although the difference between "designed for" and "designed by" may seem insignificant, it represents a fundamentally different approach to museum design. Structures that are based on actual museum visitors—their backgrounds, ages, activities, and learning—are the result of careful attention to organizational and learning goals, developmental and physical needs and abilities, and the interests of real people. Such settings take into account not only how visitors will read signs and purchase tickets, but also how they will hear each another converse and how they will feel after three hours on their feet.

Container and contents

The physical environment—comprising three-dimensional forms, volumes, and objects, as well as sounds, smells, and other sensory information—is the grand container for our lives. It can engage or overwhelm, comfort or distress, confuse or give confidence, distract or compel attention. Whether we're doing the dishes, working at the computer, driving a car, passing through airport security, taking an examination, or visiting a museum, we are always in some *place*—and the physical environment is there as well, enveloping and shaping the daily and ceremonial moments of life.

Physical context affects our behavior, moods, and feelings from birth on (if not sooner). Research has shown that even infants use contextual cues, such as windows, as landmarks in moving through space. Internalized ideas of space acquired early in life remain with us, later affecting such responses as how we interpret an open door or how we maintain space between ourselves and others.

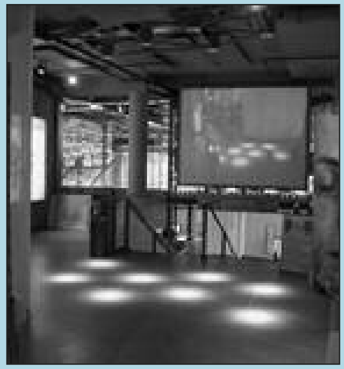
Nevertheless, we tend to think of environments as if they were a neutral backdrop to human activity, or we think of them in visual, physical, and stylistic terms—as dimensions, materials, architectural features—rather than as functional and experiential entities. Our focus is on the container and not its contents: people, with all their complex intentions, activities, and needs.

The physical context of a public space, such as a school or a museum, affects people directly and indirectly. When chairs are bolted to the floor, preventing us from conversing comfortably with others, the impact is direct. When ambiguous pathways fail to lead to an exhibit area, leaving it outside our experience, the impact is indirect. A fire door that blocks the shortest route through a building or doors that don't open as we expect them to don't just happen; they are the result of planning decisions, whether intentional or unintentional.

Environmental alignment

A museum advances its vision, mission, and values (as well as its educa-






CHALLENGING SPACES—Hard surfaces, vast and windowless boxes, densely placed exhibits, dark and confusing hallways, and failures of scale or accessibility contribute to visitor disorientation and discomfort.
Photo, top right, by Pino Zappalà; others from ASTC archives

tional and financial goals) not only by playing them out through the full visitor experience, but also by supporting them with its physical environment. This is a continual process, requiring clarity around all dimensions of planning, whether for operations, exhibits, programs, or security.

Designers, educators, cashiers—literally everyone on staff—must examine combinations of ergonomic factors, such as scale and access, and architectural features, such as walls, windows, and doors. At each step, there is an opportunity to create a strong alignment between the visitor experience and the environment.

Planning for visitors can begin with direct physical support: the size of an elevator, the width of a corridor, the number of spaces a visitor must pass through to reach a given room, the density of exhibits in that room. Attention to these elements may encourage desirable behaviors or discourage unwanted ones. For example, Elizabeth Prescott's research on children's spaces indicates that wider pathways tend to encourage greater speed, while narrower pathways seem to deter rapid movement, encouraging visitors to stroll, look and pause.

Eliminating or reducing barriers is another way we can tailor the match between visitors, activities, and setting. By reducing noise levels, we help to decrease distractions and increase visitors' focus and concentration on reading signs, engaging with an exhibit component, or talking with family members. By opening doors, adding windows and carefully arranging large objects, we unobtrusively facilitate visual surveillance—allowing parents to watch their children more easily and security staff to scan the area more effectively. By basing museum spaces on simple geometry, with views of adjacent areas and unambiguous cues about orientation, we support wayfinding—allowing visitors to navigate space competently and safely.

Finally, compensating for limitations of the physical environment can strengthen the match between content and context in several ways:

• Bland or ugly spaces can be improved by creating a level of environmental complexity, such as alcoves or curving paths, to engage but not overwhelm visitors.

• Distracting effects of an open plan can be lessened by adding visual barriers or reorienting an area.

• Cognitive fatigue, a common experience in museums, can be relieved—as Gary W. Evans points out in his 1995 article "Learning and the Physical Environment"—by adding

Recommended Readings

• Cutting, Andrea. *Orientation, Wayfinding, and Circulation: Survey of Literature.* St. Paul, Minnesota: Minnesota Historical Society, 1996.

• Evans, Gary W. "Learning and the Physical Environment." In *Public Institutions for Personal Learning,* edited by John H. Falk and Lynn D. Dierking. Washington, D.C.: American Association of Museums, 1995.

• Hall, Edward T. *The Hidden Dimension.* Garden City, New York: Doubleday & Co., 1969.

• *Journal of Museum Education, Vol. 27, No. 1 (Winter 2002). "Environments for Learning."*

• Loomis, Ross J. *Museum Visitor Evaluation: New Tool for Management.* Nashville, Tenn.: American Association for State and Local History, 1987.

• Prescott, Elizabeth. "The Environment as Organizer of Intent in Child Care Settings." In *Spaces for Children: The Built Environment and Child Development,* edited by Carol S. Weinstein and Thomas David. New York: Plenum, 1987.

• Rand, Judy. "The 227-Mile Museum, or a Visitors' Bill of Rights." *Curator,* Vol. 44, No. 1 (January 2001).

• Whyte, William H. *City: Rediscovering the Center.* New York: Doubleday, 1988.

"elements that elicit attention without effort," such as running water, plant life, artwork, or animals in a healthy habitat. Such environments feel both safe and restorative.

• Physical fatigue, the result of many factors, can be counteracted with appropriately placed seating. People like to sit down when they are tired; if no seat is available, they will find one (perhaps on an exhibit). William Whyte, who studied New York's plazas and parks in the 1980s, observed that the best form of seating is the movable chair: "Chairs enlarge choice," wrote Whyte, "[and] the possibility of choice is as important as the exercise of it."

RESTORATIVE SPACES—"Fascination" elements like water, plants, and animals can help to relieve cognitive fatigue. *Photos, clockwise from left: Cockrell Butterfly Center, by Jim Olive/Stockyard. com; Magic Wings, courtesy North Carolina Museum of Life and Science; Cockrell Butterfly Center, by Jeanne Vergeront*

Successful environments

Museum environments aligned with human activities and needs in the ways described above share certain attributes. They make visitors feel competent, comfortable, satisfied, and safe.

An example of a space that helps to orient visitors immediately upon arrival is the atrium at New York's Rochester Museum & Science Center. A lofty window wall floods the area with natural light while establishing the entry's relationship to the parking lot and neighboring buildings. Visitors can quickly scan the multistoried space to locate the ticket booth, the restaurant, exhibit areas, and other important amenities.

An example of a satisfying and comfortable space may be familiar to attendees of the recent ASTC Annual Conference in St. Paul. At the Science Museum of Minnesota (see "A Tool for Learning," page 6), the Collections Gallery possesses a simple geometry on a personal scale. It is a relatively small, L-shaped space, with low ceilings, defined areas, and well-located artifact cases that create easy sight lines and manage attention and focus. A large window wall looking out into the central atrium provides natural light and orientation, but two doors control access and shut out sound from the larger space. Both directly and indirectly, this environment supports thoughtful browsing through the many collections on display.

An example of a restorative element now found at many science centers and museums is the butterfly garden. I recently visited the Cockrell Butterfly Center at the Houston Museum of Natural Science. The glass-covered, plant-filled space flows seamlessly into the outdoors, immersing visitors in a gentle butterfly world. Temperature, humidity, and controlled physical access create soft air and a quiet space. A curving path—punctuated with places to rest, running water, and changing views—broadens and narrows as it travels through the gallery. The variety of colors and patterns captures attention and fascinates, and the leisurely floating butterflies set a restful pace for the gallery.

In contrast, museum environments that fail to take visitors' physical needs and emotional responses into account can have quite a different effect, producing discomfort, disorientation, and frustration. Undoubtedly, we all have experienced some of the following: enormous, boxy galleries with no windows and seemingly no ceiling; spaces where a visitor can see half the exhibits and hear every other visitor at the same time; stand-alone exhibition components bathed in bright light but surrounded by dark hollows and passageways that make movement feel risky.

Most areas of most museums fall somewhere between these examples. But all museums have a rich array of resources at their disposal for engineering a better fit between the visitor's experience and the museum's physical context.

Creating environments that are both aligned with organizational purposes and designed for the many dimensions of the visitor experience is not easy. Our level of sophistication in defining, studying, and measuring the effects of the physical environment is still fairly rudimentary. But in spite of all we don't know and would like to know, we can, nevertheless, proceed confidently. The physical environment makes a real difference in our visitors' experience—their comfort, learning, sense of a good value, and memories. ■

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A Tool for Learning: *Envisioning the New Science Museum of Minnesota*

By Andrejs J. Cers

At the heart of the building, linking indoors and out, is a naturally lit, three-story atrium. The spiraling central staircase serves as one of the museum's "choice clusters," affording visitors glimpses into different exhibit areas.

Photos by Timothy Hursley

Can a museum building be a tool for learning? What would make it a good tool? These were important questions when, as lead design architect with Ellerbe Becket, I began working with the Science Museum of Minnesota (SMM) in 1995 to create a new and larger home for their 90-year-old institution. Having outgrown five previous buildings, SMM demanded an inclusive approach that would assure that their new home would support their programs well into the next century.

What is the primary characteristic of an effective tool? Perhaps it is usefulness...the ability to perform a multitude of tasks efficiently. Elegant looks can be a plus, but if a tool meets its intended functional needs poorly, it is quickly forgotten.

What is a meaningful measure of utility when thinking about museum building design? Corporations often measure "return on investment." For a nonprofit institution, the primary measure may more appropriately be "return on mission." A building that supports the organization's mission more effectively than a conventionally designed structure would have significant value.

The mission of SMM is "to invite learners of all ages to explore their changing world through science." Our charge was to focus our programming and design work strategically so that the building we created would truly enhance the museum's ability to deliver this mission.

Rethinking the process

Conventional architectural space "programming," the first step in the planning process, often reduces functional considerations to a detailed catalogue of individual spaces. Based on interviews, this work is typically carried out by a predesign architect or programming specialist.

The resulting "program document," complete with tables or diagrams of desirable adjacencies, then goes to a design architect. Often, this person was not involved in the preliminary stages. He or she produces a schematic architectural design giving initial physical form to the space program. With critical early decisions thus made at arm's length, based on a static description, it is not uncommon for a space program to prove obsolete even before the building is opened.

A lack of deep, dynamic, functional understanding on the part of the design architect can also produce a building driven more by aesthetic and architectural considerations than by the actual needs of the institution. The focus is often on *the building* itself—occupancy being secondary.

In extreme cases, where a board desiring an icon or something unique has actively discouraged interference with the "architect's vision," a fully formed preliminary design may be presented before the institution has had the opportunity to evaluate it for functionality.

Once the design is put forward, it is very difficult to affect fundamental changes. The project's success will ultimately hinge on what is considered during the earliest stages of the process.

It seemed unlikely to me that a conventional programming and design process would produce the kind of building that SMM requested. Such a process is poorly suited to successfully address the complex and dynamic activities, constituencies, and interactions involved in informal science education.

SMM was equally determined to avoid the pitfalls of this approach. From the beginning, they insisted on close collaboration. At our initial meeting, the risks of relying on a static understanding were illustrated by Paul Maurer, SMM's director of exhibits.

Paul produced a list of the ways that exhibit halls in SMM's previous building had been used since they were built. His list included classrooms, theaters, retail stores, and staff offices—nearly 20 different uses, most of which had nothing at all to do with exhibits.

For a dynamic institution like SMM, a building designed around a static space program could prove an obstacle to needed change. With informal science education institutions increasingly dependent on gate

Following the Flow: A Team-Based Approach to Design

By Don Pohlman

Early in the design process for the new Science Museum of Minnesota, the five Architectural Issues Teams met over a period of about two months. Everything that came out of those meetings—drawings, lists, diagrams—was assembled into a working document we called the Idea Book. Copies were placed in the hallways of staff areas, so people who weren't on the teams could add their comments.

My team was *Visitor Flow*. Our group focused on the movement of visitors to, through, and from the building—how the museum could communicate its contents, and how it could help visitors of all kinds have successful visits. As a starting point, we created a list of visitor types, including family groups with kids, school groups, vendors, visiting scientists, and other types of visitors we had had in the past or thought we might have in the future.

Next, we tracked these visitors—sometimes in our imagination, and sometimes through observation—from the start to the finish of their visit. That is, we imagined them sitting in their kitchen, driving to the museum, parking, having their visit, and then going home again—all the while making choices that shaped their experiences. We did this for all visitor types, but probably spent more time on families with kids, our bread-and-butter audiences.

We looked for "choice clusters"—groups of choices that might occur around the same time and place within a visit, and be organized spatially within the building. We did this separately for different types of visitors, and then we superimposed the templates on each other, looking for areas of commonality and difference.

For example, we found a cluster of "entry choices" that seemed similar for most arriving visitors; these involved things like bathrooms, coat lockers, and ticket counters. Other choice clusters involved options like locating exhibits or amenities within the ticketed zone. Having determined which clusters warranted design emphasis, we then tried to imagine how the building could make them self-evident.

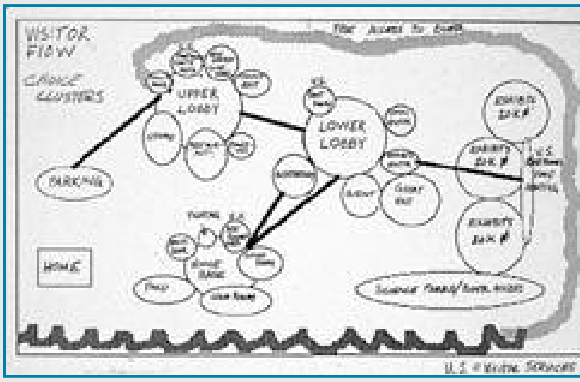
Other teams took a similar approach:

• *Material Flow* examined transport of various materials through the building; their mandate included things like developing desired cross-sections for corridors and ensuring that the routes for collections objects and for garbage would never cross.

• *Staff and Information Flow* tracked patterns of staffing and communication and considered how structural forms, such as office adjacencies, networking technology, and formal and informal meeting spaces, might affect workplace subcultures.

• *Sustainable Design* studied flows of energy in and out of the building, looking for ways to reduce energy use, operating expenses, and the embodied energy of materials and construction methods.

• *Site Relationship* considered the complex neighborhood we were moving into and looked for ways to make our new building attractive from its three main vantage points: downtown, the riverfront, and the residential neighborhood to the west.



What did we get from this process that a more traditional programming approach might not have produced? First was a substantial and efficient transfer of knowledge from the staff to the people charged with designing our new home. In the space of two months, we brought our architects into direct contact with several hundred person-years of museum experience.

Second, we developed a dynamic view of our building before making any commitments to space or form. We knew a lot about the flows we had charted before we started to build a shell around them.

Of course, it is a challenge to create continuity in a four-year process. After the Issues Teams were disbanded, we set up design review teams (including former Issues Teams members and other technical staff) to review key features of the facility on the plans, trying to relate our initial vision of how it should be done with what appeared on the architects' drawings.

Although not everything we hoped for came to pass, the big ideas of the Issues Teams did shape the final building in ways that reflected our vision and will continue to guide our growth.

Don Pohlman is director of the Peoples and Cultures program at the Science Museum of Minnesota, St. Paul.

revenues and outside partnerships, an ability to respond to the changing desires of visitors, with their multiple leisure-time choices, would be critical. And given the increasingly unforgiving funding environment, inflexibility could even prove fatal. We needed an approach that would bring us a more dynamic understanding—in short, we needed to redesign the design process itself.

responsive and functional building.

To accomplish this, we formed five "Architectural Issue Teams," each comprised of museum leadership, key staff, a program architect from my firm and myself, as lead design architect. (For a staff view of the process, see "Following the Flow," page 7.) The charge for these teams was threefold:

• To identify key issues that affect how SMM delivers on its mission

Within the exhibit areas, varied geometries provide glimpses of spaces beyond, and circular movement patterns encourage easy flow.

Issues and strategies

We began from the position that the museum is not the building, but the ever-changing organization that lives *within* the building. The role of the building is to enhance the relationships that organization enjoys with its different constituencies.

SMM's consituencies include adult visitors, families, school groups, science researchers, conservators, adult education clients, political and business interests, and residents of the community. These relationships are dynamic and often drive change in programs and offerings. We believed that working to better understand these relationships and the activities that grow around them would lead to a more

through its connections and activities;

• To develop goals and design strategies for how the building could best support these connections; and

• To critique subsequent architectural design work according to how well it met the identified goals.

Focus on the visitor

Though all of the Issue Teams identified qualitative goals and strategies around critical relationships, the most important was with the museum's visitors. The Visitor Flow (VF) team—drawing on its extensive experience, on-site research, and focus group findings—developed design strategies in support of three key goals for the visitor experience:

• *Easy to use.* Strategies for achieving this VF goal revolved around "choice clusters," spatial points within the museum where visitors would logically make defining choices about their visit. The idea was to anticipate and address their needs as much as possible, thereby reducing confusion and improving user-friendliness. This approach was used throughout the building design.

We also developed circular movement patterns through exhibit areas, avoiding dead ends, so visitors could be led by their own curiosity rather than having to follow a rigid scheme.

• *Full of surprises.* This goal led directly to our adoption of a relaxed, informal architectural geometry for the building. The spatial sequence from the entry was carefully developed to evoke a sense of anticipation. The use of varied and contrasting geometries created a sense of unpredictability. This was not accomplished at the expense of "easy to use," however, for all spaces were organized logically around the choice clusters. We made a point of using natural light at central orientation points, so visitors can always find their way back from any place in the building.

• *Makes you feel connected.* Large museums sometimes feel claustrophobic, like dark labyrinths isolated from the outer world. SMM wanted its visitors to be continuously stimulated by opportunities, so the architecture was opened up to allow glimpses from one program area to another. By minimizing walls and planning movement paths through, rather than between, spaces, we avoided the need for constricting corridors.

The building was also opened up to its surroundings. The lobby was conceived as an extension of the open urban space of downtown St. Paul, while the Mississippi River side of the museum was designed to cascade down the bluff into the valley below. From the interior, varied glimpses and panoramic views of the river valley are revealed as visitors move through the structure.

With its broad plaza and winding paths, the 11-acre SMM complex (inset, left) links downtown St. Paul with the Mississippi riverfront and residential neighborhoods to the west. Inside, expansive windows in the entry lobby (above) frame a classic urban view: the city's historic public library and Rice Square beyond.

Putting it all together

Having the ideas and materials developed by the Issue Teams as a resource early in the project gave me a better foundation for creating and evaluating initial design ideas. Synergies of function, aesthetics, and experience were easier to identify when we understood the individual requirements beforehand.

As the architectural process evolved toward creative synthesis, it produced a multi-threaded solution that can be seen in the following aspects of the final project:

- A flexible, layered approach to environmental control allows the amount of exhibit area under strict temperature and humidity standards to expand or shrink as needed.
- Exhibit-level floor-to-floor heights and adjacencies are set so that stacked levels of staff space could be converted to additional exhibit area.
- Critical elements of vertical circulation are positioned toward the periphery, so that changes in use of floor space are unimpeded.
- Investment in costly finishes was minimized, giving exhibit and program developers greater control over the visitor environment.
- Fixed elements, like the tiered auditorium, are placed so they can be used in different ways. This made it possible to turn the auditorium into a 3-D laser theater on opening day.

In leading any design project, I always strive toward what I call "the simplicity on the other side of complexity"—that is, a design solution economical in its means, yet rich in its response to a broad range of needs and circumstances.

For science centers, responding to changing needs is more important than ever. I believe architects who design informal science education buildings need to find ways to address that reality. Only by looking beyond traditional notions of the building as an architectural icon can we truly begin to respond to the challenges facing our institutions—and achieve a building that deserves to be called a tool for learning. ■

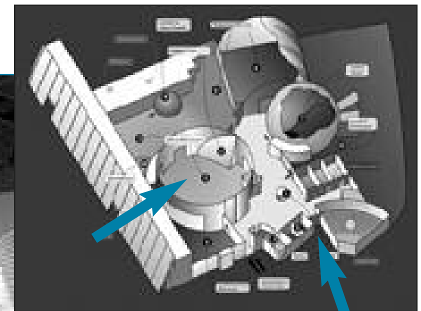
Andrejs J. Cers was lead design architect for the Science Museum of Minnesota. He is currently principal of AJC Architecture, in Minneapolis.

First Impressions:

Thoughts on Entering the Museum

By Mikko Myllykoski

The current entrance to Heureka: The ticket booth is on the left, and the information booth on the right, beside the Cylinder Hall.



A change in plans moved Heureka's entrance from a vantage point above the Cylinder Hall (left arrow) to a narrow doorway at ground level (right arrow).

Image, above, courtesy Heureka; photo, left, by Kirill Lorech

Early museums were built as treasure cabinets, designed to keep collections safe, solemn, and sacred. I have always thought, for example, that the old State History Museum in Stockholm resembled a coffin, with its dark heavy iron door and hardly any windows. A man recently interviewed on the street in Cape Town, South Africa, identified his city's white, shiny, temple-style arts museum as...the Parliament building.

Still, museums are meant to be entered, and the character of the institution is generally revealed in its entrance area. The approaches to the first public museums—with their broad and lofty staircases leading to echoing lobbies of stone—were designed to shrink the people who entered the shrine, establishing their role as seekers or worshippers of wisdom. The message was, "Are you worthy to enter here?"

Today's cultural institutions look at audiences from a totally different perspective. Everybody is a potential visitor, and the architecture is more open and utilitarian. But the overall effect can still be monumental, and entryways still convey a message.

The spacious foyer of the new National Museum of Australia, in Canberra, for example, takes the form of a sailor's knot: The architects' concept was the binding of the aboriginal and colonial cultures, like the binding of two ship's ropes. But who can recognize a sailor's knot from the inside? Visitors need a guide to tell them the story.

In the same way, people who enter architect Daniel Libeskind's Jewish Museum, in Berlin, face many symbolic spaces before the actual exhibition starts. A subterranean corridor goes downhill and uphill; a crossroads leads to a dead-end, a maze, and an abyss. In an essay posted on the museum's web site, Libeskind reveals that his name for the project is "Between the Lines" and talks about the four symbolic aspects of the building. On my visit, the staff—perhaps tired of answering so many visitor questions—had labeled the various structural elements with ad hoc sheets of paper: "Here the architect tries to say that..."

The ideas that these institutions are trying to convey—about contact and communication, or the lack of contact and communication—are valid and important. But what needs to be communicated to the arriving visitor along with the symbolic story is practicalities. What is in the museum to be experienced? How much time and money should I invest in different elements of that experience?

At my museum, Heureka, the Finnish Science Centre, our most frequently asked question is "Where are the toilets?" "Behind the coat racks" is the answer...and often the end of the dialogue.

Science centers were conceived as a new kind of museum, one that would be inclusive and empowering, offering visitors a platform for active encounter. Their message is, as we put it at Heureka, "We aspire to bring the joy of discovery to everyone." But sometimes our buildings are more exciting than inviting, and entrances continue to set the stage for the visit.

The story of the entry at Heureka is interesting—and still evolving. It is no easy matter for visitors to find their bearings on entering the science center. The lobby that serves as the beginning and end point of every visit is merely an interstice, an empty space with a small ticketing booth at the center, that lies between the clearly delineated structures of the Auditorium, the Cylinder Hall, the Vaulted Hall, the Pillar Hall, and the spherical Verne Theatre.

This was not the original design for the entrance. In the late 1980s, architects Mikko Heikkinen and Markku Komonen envisaged a quite different arrangement. Because Heureka sits directly adjacent to the main northbound railway lines from Helsinki, the architects' idea was that visitors would arrive in a car park on the far side of the tracks, take an elevator up to a bridge, walk across the rail lines, and enter the science center from above. They would then descend a curving ramp, enjoying a clear view across both sides of the exhibition facilities before reaching the ticket booth.

This design contrasted totally with museum architecture that diminishes the visitor. But when the science center was constructed in 1989, the bridge over the tracks proved too expensive. A tiny balcony was built where the bridge was to have entered the building. Today, the three out of four visitors who arrive by car or bus must walk under the railway and uphill to the current entrance, and face a confusing and noisy space when they arrive.

But the original plan was not forgotten. That tiny balcony reminded us of our past and helped us envision a future that is now taking shape. Our 10-year Heureka Futures Project calls for a 70 percent expansion of the science center itself, with a new giant screen theater, a well-equipped science laboratory center, and a restaurant. On the far side of the railway tracks, a planned cultural complex will house tenants like the University of Helsinki's Institute for Continuing Education, the Museum of the Moving Image, the Finnish Aviation Museum, the Music and Dance Centre, and the Museum of (Finnish) Television.

We expect to start construction in 2006; our dream is to open the new science center in 2008, and the entire complex by 2014 for Heureka's 25th anniversary. A key feature of the design will be the bridge across the railway, linking the science center to its new neighbors. Finally, visitors entering Heureka will be able to experience that dramatic overview, just as Heikkinen and Komonen intended. ■

Mikko Myllykoski is director of experiences at Heureka, the Finnish Science Centre, Vantaa, Finland.

The Power of Signs

By Rick Stroup

Like most museums, the Reuben H. Fleet Science Center in San Diego (the Fleet) offers visitors some experiences that require them to obtain tickets, find out where to go, and wait in line. The key to making that process go smoothly—for visitors and museum staff alike—is letting people know what to expect.

That wisdom wasn't gained without pain. Last year, astronaut Scott Carpenter came to speak at the Fleet. With previous lecture events, we had always set up an open hall and let people wander in as they chose. This lecture proved wildly successful; the queue went out the door, down several passages, and back into the center.

The hall filled, and there were still people wanting to get in. With no system for capacity control, we didn't know when to cut off the line. Visitors were angry, and rightly so.

Since then, whenever we do a lecture, we ask visitors to obtain a ticket (still free) in advance. We put that in our newsletters, but we also set out signs—in the main ticketing area, at the lecture hall, and in the corridor where ticket holders line up—to tell people who wander by what the event is and that they need to ask at the ticket counter for a ticket. If a book signing is part of the event, we set up a sign and a queuing area for that, too.

At the Fleet, I am constantly reviewing signage. This helps me catch the occasional goof (like when we directed visitors to the "Virtual Reality Restrooms"), and it also keeps me in touch with the visitor experience.

People enter the science center through turnstiles. We used to have wayfinding signs hung high up beyond that point, directing visitors to the IMAX theater or exhibit galleries. One day, as I stood in the entryway, I realized that people never looked at those signs; their attention was totally on the turnstiles. We moved the signs to just above the entry point, and the "How do I get to…?" questions dropped off dramatically.

Too much signage is as bad as too little. The Fleet's rotunda is a busy, crowded, colorful place. People come there to buy tickets, eat at our café, and visit our store. It's important to limit the amount of marketing, membership, and other institutional information that's on display. Somebody has to act as gatekeeper, and that's me.

What we do publicize in the rotunda, however, is anything that affects the visitor experience. For example, if we are going to shut off some part of the science center at 4 o'clock, I will have signs in the ticketing area from the minute we open our doors. That way, visitors can plan their day and see everything they want to see.

We used to have a similar planning problem with our motion simulator. To get to it, visitors take an elevator to the basement, enter a story theater, and finally reach the *Deep Sea* ride, which lasts 15 minutes and accommodates 23 people per session.

People were always asking, "Will we be able to get on together?" or "Can I do this and still see the 12 o'clock IMAX show?" Our challenge was how to tell them what to expect.

At Disneyland, a sign will say, "30 minutes from this point." That doesn't work for us because people enter in groups, and they have to wait until the previous scenario ends.

We came up with signs that include small mechanical clocks. Posted at the start of the queuing area and at the entry to the simulator itself, the signs say, "The next mission will depart at… 11:10," or whatever the time is. The simulator operators set them.

The signs also state that 23 people will go on the ride at one time. Visitors in line can simply count off and reorganize themselves, if need be. The system helps them plan the rest of their visit as well, since, instead of wondering about making it to another event, they can self-time it.

Signs empower people. Give them the information they need, and they can live with whatever is going on. They feel that they are in control.

Rick Stroup with his motion simulator sign.

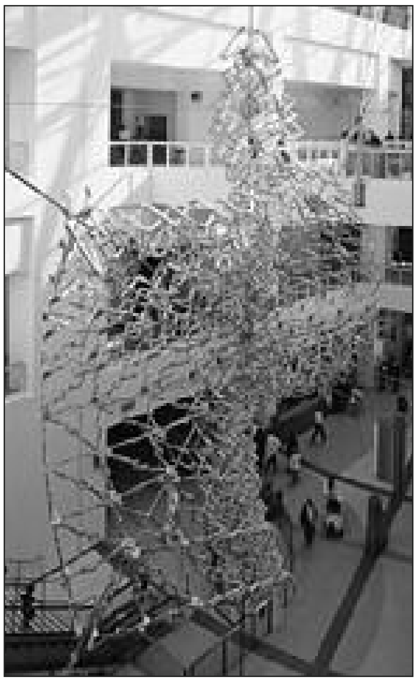
Photo courtesy Reuben H. Fleet Science Center

Rick Stroup is director of visitor operations at the Reuben H. Fleet Science Center, San Diego, California.

Organizing Museum Space:

Learning Stages as Physical Context

By John W. Jacobsen



As the prime focus of an open area, "icons"—like the Hoberman sculpture at the California Science Center (left) or *Acrocanthosaurus* at the North Carolina Museum of Natural Sciences (above)—evoke powerful associations and foster kinesthetic understanding. *Photos courtesy California Science Center and North Carolina Division of Tourism, Film, and Sports Development*

In their book *Learning from Museums: Visitor Experiences and the Making of Meaning* (AltaMira Press, 2000), John Falk and Lynn Dierking define learning as a "contextually driven effort by people to find meaning in the real world."

Learning in museums, they say, occurs in the interaction of four contextual factors: *personal context* (the individual's prior experience, knowledge, and interests); *sociocultural context* (the interaction of visitors with others, including cultural influences); *physical context* (the architecture and physical elements of the exhibitions and programs); and *time* (the lifelong learning experience of the visitor).

It is the physical context I want to discuss here. In a liberal adaptation of Falk and Dierking's Museum Experience Model, I define the physical context of the museum as including not only the architecture, exhibits, and collections, but also—as our human presence has become an integral part of the visitor's experience in our museums—the staffed museum programs run in, and among, exhibits. The term "learning stages," as used here, refers to a museum's galleries and theaters, its physical staging places for learning.

Galleries as theaters

Like performing arts complexes, museums might think of their public spaces as a variety of learning stages, with a range of built-in equipment capable of hosting changing exhibits. These themes and learning stages should complement other museum facilities in the community.

Visitor groups create their own museum experience when they select a sequence of galleries and theaters to move through, in addition to their experiences entering and exiting the museum. Asking "What does each visitor segment want from their succession of learning stages?" should be foundational to any museum trying to be responsive to learners' needs.

Do visitor groups want a sequence of galleries that are similar or distinct in meaningful ways? How does that sequence work as an overall experience? Where do you put the most spectacular gallery? Are there issues with adjusting vision from dark to light spaces? Do visitors get lost, distracted, and disoriented?

Basic architectural specifications, such as windows or darkness, ceiling heights, acoustic qualities, HVAC systems, security features, load-in access, and lighting make some galleries more appropriate for certain kinds of exhibits and programs than others. A room for paintings is not a room for a touch tank, for instance. Add to the basic architecture a series of long-term built-in systems and support spaces—the *experience platform layer,* to borrow a term from museum consultant Roy Shafer—and a gallery becomes a flexible stage geared to support certain kinds of learning.

In the water play area at the Children's Museum, Boston, for example, views of the Fort Point Channel relate to the shape and challenges of several large water tables inside the gallery.... This is a room designed and outfitted for water play. It is also a learning stage that successfully nurtures collaborative problem solving and adaptation skills.

Stages for learning

Differentiating galleries architecturally inside the exhibit zone allows for light and dark spaces, intimate and grand spaces, and that variety keeps the experience fresh for visitors. Different spaces should have built-in support and characteristics to host a succession of compelling visitor experiences. This capacity to change the content of its learning stages is the core of the flexible approach to planning that I call the "Delta museum."

The costs of flexible systems lead toward capitalizing each learning stage to build in support systems specific to the long-term learning objectives for that stage. Neighboring stages may have different characteristics; not every gallery needs a dimming system or 250 pounds/square foot floor loading.

Expanding the learning impact of any exhibit we are working on should be one of the planner's prime objectives; however, it is useful to go with a format's strength. Galleries with a rich array of graphics, artifacts, and photos, as might be found in a history museum, can help build an adult visitor's skill at synthesizing images and ideas into observations. A light and airy art gallery may support contemplation, appreciation, and reflection skills in the same adult, while a museum workshop setting may help teens develop problem-solving and teamwork skills.

In trying to sort through the physical contexts that are most appropriate for different learning needs, I analyzed a wide range of museum experiences to see how they might clump together into categories of activity and space. Out of that analysis emerged the 10 broad categories of "learning stages" that I call the Physical Context Framework (see table below).

Some of these approaches to gallery design can be successfully combined. Hands-On Arenas, for instance, can be brought into Showcases, Immersion Environments, or other learning stages, but Discovery Worlds are poor mixes with Contemplative Galleries. The relative scale of a museum's learning stages and how they are orchestrated are key brand and management decisions that ultimately determine the character of the institution. Science centers tend to use lots of Hands-On Arenas; aquariums have Tunnels of Wonder and Immersion Environments; and art museums tend to have Contemplative Galleries. The choices also affect which learning needs and audience segments the institution is most likely to serve best.

Some museums specialize in just one or two of these 10 categories of learning stages; others offer a number of distinct galleries and graphic approaches, each with its visitor fans. Some vary the formats, but graphically brand all labels and signs for consistency and clarity of institutional voice.

Remodeling or building new museum galleries can no longer be about just creating great exhibits. If we are to be responsible stewards of our community's scarce capital dollars, then we should invest our supporters' funds in flexible learning stages. ■

John Jacobsen is president of White Oak Associates Inc., Marblehead, Massachusetts. This article is adapted from a longer piece in White Oak Forum '02: Museums and Learning Stages, *© 2002 White Oak Associates Inc. To request a copy, visit* www.whiteoakassoc.com.

Learning Stages: A Physical Context Framework

LEARNING STAGE	SAMPLE APPLICATIONS	ARCHITECTURAL SNAPSHOT	DAYLIGHT	LEARNING SKILLS STRENGTHENED
Contemplative Galleries	Art & collections	Light, quiet, calm, formal and open	Diffused	Reflection, appreciation
Showcases	Interpretive displays & graphics	Spotlit cases and rare artifacts, mixed with photos, labels, and videos	Seldom	Understanding, synthesis
Tunnels of Wonders	Dioramas, period rooms, aquaria	Dark corridors with lit windows into stage sets	No	Exploring, observing
Theaters/Presentations	Auditoriums, demo stages, IMAX	Audience/stage areas supported by lighting and sound systems	No	Linear narratives, empathy, perspectives
Immersion Environments	Historic rooms, space capsules, botanic gardens	A complete and convincing surrounding reality	No	Discovery, engagement inspiration
Hands-On Arenas	Science and technology centers with interactive exhibits	Open informal spaces encouraging activity	Possible	Problem solving, experimenting, discovering
Discovery Worlds	Storyland, climbing structures, mini-villages	Playful, fantasy, clean, light with small spaces	Possible	Exploring, discovering, creating
Worskhops & Studios	Art studios, reference rooms, classrooms	Focused work spaces out of main flow	Possible	Problem solving, team building, confidence building
Icons	Dinosaur, Mona Lisa, Liberty Bell	Prime focus of an open area	Possible	Reflection, kinesthetic understanding
Open Spaces	Lobbies, atria, rotundas, hallways	Views and daylight in calm rest areas	Yes	Synthesis, framework building, questioning, evaluating

Source: White Oak Associates, Inc.

Access to Information:

Wayfinding for All Visitors

By Ellen Rubin

Access to information is a key element in assuring visitor comfort in the museum: Can people find out what they want to know, when they want to know it? This criterion applies to all stages of a visit, from looking up hours and directions on the Web to finding one's way around the exhibit halls. And it applies to all types of visitors, including those with disabilities.

As a disability access consultant, I have worked in science centers and museums for more than seven years. I have visited many institutions as a student of museum education, and I often go to museums with my family for pleasure. These experiences allow me to consider access to information from both a professional and, because I am blind, a personal perspective.

Before the visit

Ideally, any institution I plan to visit will have a web site with a text-only version my computer can read. Realistically, I don't expect everything to be accessible online, but I do hope the site will tell me how to get to the museum from different locations and what kinds of accommodations I can expect to find once I arrive. Because I rely on public transportation, I also appreciate knowing how long the trip will take. Other visitors may want to know the location of the wheelchair entrance or the accessible parking.

Web designers might not think of this, but it would be great if museum sites could give a short text introduction to their building, in addition to a diagram. Unlike cities, which have a predictable pattern of streets, buildings are not intuitive. To a blind visitor,

Using a cordless phone to locate and learn about exhibits, a woman participates in the second evaluation of *Ping!* at the New York Hall of Science. *Photo by Steven Landau*

knowing that "when you enter the lobby, the ticket counter is immediately in front of you" would be helpful.

Another benefit to publicize online is tours developed for specific audiences, such as people with visual or physical disabilities. Years ago, I went on a touch tour at the Hirshhorn Museum in Washington, D.C. The guide was knowledgeable, we could touch everything on the tour, and I remember feeling, "This is terrific!"

If you offer such events, be sure to schedule a choice of times. For someone who has a full-time job, learning about a tour that's available only in the daytime can be frustrating. Equally annoying is a specialized tour that is too short; a friend who is blind was disappointed when the museum she visited would not extend her tour or give her a second appointment.

Entering the museum

People who are blind naturally find their way by listening to sounds and walking toward sounds. A high level of noise in the museum can be distracting. If it's so loud in the lobby that I can't hear the sound of the cash registers, I can't find the ticketing area.

One thing that definitely increases my comfort level is to be greeted by someone who has an understanding of what my needs are. Recently, I went with some friends to the American Museum of Natural History, in New York. It was right after Christmas, and there was a long wait to buy tickets. In our group was a child who has a disability that makes it hard for him to stand still.

His mother explained to the attendant in the lobby that her son has difficulty with lines. The place was very busy, but the man helpfully suggested that she take the boy to a nearby area, where he could move around more freely. "When your group gets to this point in the line," he said, "you can rejoin them." His courtesy made us all feel comfortable and welcome.

I had a very different experience at the National Park Service museum on Ellis Island in New York Harbor. My grandparents passed through Ellis Island when they came to America, and I like to go there with family. The first time I went, the people at the front desk told me there was audio description equipment for the video on the immigrant experience. I used it, and the description was excellent. The next time I visited, I asked for the equipment, but the person on the desk hadn't heard of it. The third time, I insisted that they look. They found the equipment, but the batteries had run down and the audio wouldn't work. Providing an accommodation isn't enough; you have to make sure staff know about it and are committed to making it available.

Interacting with exhibits

Because I am familiar with science centers, I know what to ask for in a new place, and I usually find manipulatives I can enjoy. What I don't always find is accessible information about those exhibits.

In one science center, they had a tactile exhibit on animal teeth. I could feel the differences in the samples, but I had no way of knowing which animals they were and why the teeth were different. In another museum, there was a "Compare the Bones" exhibit with color-coded tags. It would have been easy to make them tactile instead, using a shape or a texture in addition to the color.

Braille is great for those who read it, but there are considerations for its use. Labels need to be at an angle (20 to 30 percent) for comfortable use, and they should be in a consistent location, so visitors can find them easily. Some museums keep a portable binder of Braille exhibit descriptions at the front desk. However, since only about 10 to 15 percent of people who are blind or have low vision read Braille, some visitors may need other types of accommodations, such as audio or large print.

Portable audio devices are very helpful. At the New York Hall of Science, in Queens, they use an acoustic guide system. Each exhibit has a raised number or character that corresponds to a number on the audio tour. You go in whatever order you want, push the appropriate button, and the guide gives information about that exhibit.

It takes skill to script an audio tour for all users without causing listeners to wonder, "Why are they saying that?" At the New York Hall, the tour is written with enough description to be useful for both sighted visitors and people with low or no vision.

A few years ago, my colleague Steven Landau, of Touch Graphics, and I worked with Betty Davidson at the Museum of Science, in Boston, to develop a talking kiosk for their *Messages* exhibition. The idea was to orient visitors who have visual impairments to the exhibition, allow them to choose what they wanted to explore, and give them a framework for connecting with individual exhibits.

Located just outside the entrance, the kiosk is accessed through a menu or by touching raised drawings. The user presses different areas of the map or listens to a list and punches a button for more information. The audio describes each exhibit and gives directions to get there. (Adding a monitor would have made this useful to all visitors, but we didn't have the funds.)

The script also notes the level of accessibility for each component. Visitors want to know what's there, even if it's just a screen display. Perhaps they can get a friend to look at it with them.

The next step

A talking kiosk works well, but it has drawbacks. After you finish with one exhibit, you must return to the kiosk for directions to the next one. The technology is expensive, and it doesn't adapt well to traveling exhibitions,

Evaluating *Ping!*

By Ellen Giusti

Ping! (a working name) is a user-activated audio beacon system designed to help blind and low-vision visitors locate and interact with museum exhibits. Visitors use a cell phone as a remote control to choose a personal "ping" sound—a chime, bird call, or other short audio signal—and then select an exhibit or other destination from a list of options recorded in the system. Pressing the "1" key triggers the personal ping from a speaker at the destination. The sound can be replayed as often as needed.

Once the visitor reaches the exhibit, the phone becomes an audio guide, providing verbal explanations plus descriptions of all exhibit features. *Ping!* also serves as a wayfinder to more distant destinations within the museum, activating a sequence of audio beacons as "stepping stones."

Formative evaluation, part 1

In June 2002, Touch Graphics conducted an initial feasibility study at the New York Hall of Science, with 4 female subjects, aged 25 to 50, during nonbusiness hours. One woman was blind; three had low vision. Each spent about 40 minutes using *Ping!* to find and interact with exhibits.

Afterwards, the women were interviewed on the phone and in person by the evaluator. The computer collected data on users' actions: "ping" sound selected, number of "hits" to reach a destination, time spent at a location, and answers to survey questions.

The test showed that *Ping!* could enable visually impaired people to tour a museum under controlled conditions. Although there were some technical glitches, all subjects said the system was "easy to use" and "very effective." Suggestions included adding voice recognition, a "go back" feature, and a hands-free option.

Formative evaluation, part 2

Funding for Phase I of the project came from the National Science Foundation's Small Business Innovation Research program. A second evaluation was conducted at the New York Hall in July 2003, when the museum was open to the public. The 12 subjects included 7 females and 5 males, aged 14 to 56. Seven were totally blind, and 5 had low vision. Like the earlier subjects, all had good mobility, some aided by dog guides and some using long canes.

Subjects received initial instruction and engaged in a period of free exploration, with help from Explainers as needed.

Despite some technical problems, *Ping!* continued to perform well. All subjects were able to hear, distinguish, and follow the sound they had selected amid ambient noise and pings chosen by other users.

Mainstream visitors were not distracted by the beacons, an initial concern of the study team; they appeared to associate the sounds with the ubiquitous beeps and chirps of museum exhibits. All users were able to locate a distant destination (the entry desk) by means of the stepping stones, albeit with varying levels of confidence and ease. Suggestions included adding volume control and audio information about the number and location of stepping stone beacons.

In interviews, all users said they preferred using *Ping!* to visiting with a sighted friend: "Interpretation is more knowledgeable and accurate...." "User can go at his or her own pace...." One subject said, "The beacons with the *Ping!* sound were a dream, very easy to follow." Another said, "I didn't expect to like it; now I wish it was available."

Ellen Giusti is director of exhibition evaluation at the American Museum of Natural History, New York.

which may have to be configured differently in different spaces. Steve and I began thinking about a new way to orient visitors to exhibitions.

Inspiration came at the end of a long day of meetings in Boston. It was cold and drizzly, and we couldn't find Steve's car in the parking lot. Knowing that he has one of those remote access locks, I said, "Steve, press your little clicker." The car chirped in response, and that's how we found it. As we were driving home, we realized that if we could get a component in an exhibition to chirp (or quack, or whatever) at us, we could create a wayfinding system that would offer the same kind of information we had in the *Messages* kiosk.

We played around with the idea, and Steve came up with a prototype we call *Ping!* Alan Friedman, director of the New York Hall of Science, generously offered his museum for formative testing, and Ellen Giusti, of the American Museum of Natural History, agreed to be our evaluator. With support from the National Science Foundation, we have done two evaluations so far (see "Evaluating *Ping!*, page 15), and we are pursuing funding to continue the project. There have been some technical glitches, but overall people are excited by it.

You don't have to have high-tech devices, however. There are simple, inexpensive adaptations that can help create a more accessible exhibit. When you use color to differentiate between elements, think "high contrast," adding texture or shape so that it works well for all. If you are mounting items that you want visitors to compare, make sure they are facing the same direction. Use flooring textures to direct visitors to emergency exits, specific exhibitions, or back to the entrance lobby. Above all, train members of your staff to assist visitors with the accessible features of your exhibits, and make sure they let visitors know that these accommodations exist. ■

Access consultant Ellen Rubin (ellenr@panix.com) worked extensively with ASTC's Accessible Practices project.

Calendar

MARCH

12–13 **ASTC RAP Session.*** "Designing and Sustaining a Fee-Based After-School Program." Exploris, Raleigh, North Carolina.

31–Apr. 3 **Museums and the Web 2004.** Arlington, Virginia ***Details:*** www.archimuse.com/mw2004/

APRIL

1–3 **Board Chairs and Directors: Partners in Leadership.** Getty Leadership Institute, Los Angeles, California. ***Details:*** www.getty.edu

23–24 **ASTC RAP Session.*** "Museum/University Collaborations: Getting Together to Write a Winning NSF Proposal." Discovery World, Milwaukee, Wisconsin

MAY

3–5 **Interactivity 2004.** Annual conference of the Association of Children's Museums. New Orleans, Louisiana. ***Details:*** www.childrensmuseums.org

6 **Seventh Annual Space Day.** "Blazing Galactic Trails." Washington, D.C., and other U.S. locations. ***Details:*** www.spaceday.org

6–10 **2004 American Association of Museums Annual Meeting.** "Celebrating Innovation, Creating the Future." New Orleans, Louisiana. ***Details:*** www.aam-us.org

18 **International Museum Day.** "Museums and Intangible Heritage." Worldwide. ***Details:*** http://icom.museum

21 ***Math Momentum in Science Centers* Workshop.** "Examining Data." Sponsored by TERC, ASTC, the Mid-Atlantic *Youth*ALIVE! Regional Network, and the Virginia Marine Science Museum. Virginia Beach, Virginia. ***Details:*** Angela Wenger, awenger@njaquarium.org, 856/365-3300

JUNE

10–11 **ASTC RAP Session.*** "Exhibits and Expansion in the 21st Century." Liberty Science Center, Jersey City, New Jersey.

JULY

10–30 **Museum Management Institute.** The Getty Institute, Los Angeles, California. ***Details:*** www.getty.edu

AUGUST

3–7 **Visitor Studies Association Annual Conference.** Albuquerque, New Mexico. ***Details:*** www.visitorstudies.org

SEPTEMBER

18–21 **ASTC Annual Conference.** "Sustaining Innovation in an Era of Rapid Change." Hosted by the Tech Museum of Innovation, San Jose, California. ***Details:*** www.astc.org/conference

OCTOBER

1–2 **ASTC RAP Session.*** "Successful Summer Camp Experiences." Rochester Museum & Science Center, Rochester, New York.

* *Information on ASTC RAP sessions is available at* www.astc.org/profdev/. *For updated events listings, click on "Calendar" at* www.astc.org.

Governance Grows

The November 2003 meeting of the ASTC Board of Directors in St. Paul saw approval of eight new Governing Members, the largest group ever accepted at one time. The new members include

- **At-Bristol,** Bristol, England, U.K.
- **Clore Garden of Science,** Rehovot, Israel
- **Denver Museum of Nature and Science,** Denver, Colorado
- **McWane Center,** Birmingham, Alabama
- **National Museum of Emerging Science and Innovation** (MeSci), Tokyo, Japan
- **Science Center of Iowa,** Des Moines, Iowa
- **Singapore Science Centre,** Singapore
- **Teknikens Hus,** Luleå, Sweden.

Credit for the expansion goes to the Membership Committee, which came up with a streamlined approach for approving members at this level.

Previously, a prospective Governing Member had to complete a site review, involving a detailed questionnaire and a visit by two science center directors. Under the new procedure, the science center or museum submits a four-page application, along with supporting materials, to the Committee, which then determines whether the institution is eligible for Governing status. All new Governing Members must still complete a site visit and peer consultation within two years of approval.

Math Workshop Planned

A *Math Momentum in Science Centers* workshop is scheduled for May 21 at the Virginia Marine Science Museum, Virginia Beach. The six-hour course, led by a TERC math educator, will provide participants with the opportunity to explore the role of math in science centers, with a particular focus on data.

Collecting and analyzing data are integral parts of the scientific process. If science centers hope to help visitors experience science, then involving them in examining data is a logical step. The session will begin with a hands-on data-collection experience, continue with an analysis of data available at the Virginia Marine Science Museum, and end with an exploration of a video case study of mathematical inquiry. Activities will connect with the National Council of Teachers of Mathematics (NCTM) Data Standards as we consider how visitors—and science center staff—might be engaged with data while broadening and questioning their view of math.

The workshop is sponsored by the Mid Atlantic *Youth*ALIVE! Regional Network, the Virginia Marine Science Museum, the *Math Momentum in Science Centers* project, TERC, and ASTC. Funding is being provided by the National Science Foundation. The fee is $25, and participation is limited.

For information, contact Angela Wenger: awenger@njaquarium.org, or 856/365-3300 x328.

A Friend Moves On

In late December, Sally Middlebrooks resigned her position as ASTC's director of education projects, citing her desire to pursue other projects and personal goals.

During her seven years at ASTC, Sally accomplished a number of important objectives. Her study of partnerships between U.S. ASTC-member institutions and college teacher education programs led to the 1999 publication of her book *Preparing Tomorrow's Teachers: Preservice Partnerships Between Science Museums and Colleges*. Sally also helped to plan and served as in-house coordinator for the ASTC RAPs.

But perhaps her greatest legacy to the field was her work in promoting greater museum accessibility for people with disabilities. Between 2000 and 2003, Sally conducted 16 NSF-funded *Accessible Practices* workshops at 10 science centers and museums for exhibit designers, visitor services staff, and facilities managers. Materials from those sessions, as well as the e-newsletter EXCHANGE and other accessibility resources, can be found on the ASTC web site at *www.astc.org/resource.* ■

Welcome to ASTC

The following new memberships were approved by ASTC's Membership Committee in November 2003. Contact information is available in the Members section of the ASTC web site, www.astc.org.

SCIENCE CENTER AND MUSEUM MEMBERS

- **Columbia Memorial Space Science Learning Center,** Downey, California. Scheduled to open in 2006, the center will focus on space science and aviation.
- **East Kentucky Science Center,** Prestonsburg, Kentucky. Operating in its new facility on the campus of Prestonsburg Community College, this rejoining ASTC member now has 3,000 square feet of exhibit space, a 1,000-square foot Science Classroom, and a state-of-the-art domed planetarium.
- **EdVenture Children's Museum,** Columbia, South Carolina. Opened in November 2003, this 67,000-square-foot facility features eight exhibit galleries and 40-foot Eddie, "the world's largest child."
- **South Florida Science Museum and Bishop Planetarium,** Bradenton, Florida. Opened in 1947, this natural history museum is in the middle of a $5 million renovation program to rebuild its fire-damaged planetarium and education wing.

SUSTAINING MEMBERS

- **Arkitek Studios,** Seattle, Washington
- **Bally Design, Inc.,** Pittsburgh, Pennsylvania
- **Dynamic Displays,** Detroit, Michigan
- **Lynch Exhibits Inc.,** Burlington, New Jersey (approved May 2003).

Spotlights

By Carolyn Sutterfield

Explora, newly opened in Albuquerque, New Mexico, features many small-scale exhibits set off in defined spaces. *Photo courtesy Explora*

'IDEAS QUE PUEDES TOCAR'—On December 13, 2003, **Explora,** in Albuquerque, New Mexico, celebrated the grand opening of its new 50,000-square-foot facility.

Explora's open learning environment includes not only a range of manipulative possibilities intended to encourage investigation, but also many small-scale exhibits set off in defined personal spaces with seating. In the museum's theater, live actors perform scripts created by staff.

Explora also offers more than 100 educational programs in science, technology, and art for groups ranging from preschool to senior citizens, as well as professional development for teachers. Most are available for outreach throughout New Mexico.

According to director Paul Tatter, development of exhibits and programs has been strongly influenced by community needs. "Because 40 percent of the local population speaks a home language—predominantly Spanish—other than English, Explora features bilingual signage and bilingual floor educators," Tatter says. "And because our Native American and Hispanic cultures have strong oral traditions, visitor interaction with floor educators is an essential element of exhibit design." Exhibits and environment alike support extended families, accommodating a three-generational range of prior experiences and personal histories.

Explora operates in a private/public partnership with the City of Albuquerque, which funded construction of the new facility with a $10 million Quality of Life temporary tax. The board raised an additional $5.3 million for the capital campaign, including $2.4 million in state funds and $2.9 million from major donors Intel, PNM, General Mills, Wells Fargo, Cisco Sytems, and Lockheed Martin/Sandia National Laboratories, and other private sources.

Details: Maria Franco Tapia, mftapia@esccma.org; *www.explora.mus.nm.us*

SPACE FOR DISCOVERY—With so much attention focused on big-ticket items in museums, including simulators, 3-D theaters, and immersive experiences, one might think the collections-based discovery room had gone the way of the slide rule. But not at the Sciencenter, in Ithaca, New York. After several years of research and a lot of hard work, largely by volunteers, the museum opened its new *Discovery Space* in March 2003.

Former staffer Stephanie Thompson and a Sciencenter team developed more than 20 discovery boxes for the new room. The activities are suitable for a range of ages. Topics include fingerprinting, magnification, electricity, colors, astronomy, and more. Each box holds an instruction booklet and materials for several activities; labels identify which boxes are intended for younger visitors and which work best with a partner.

As with most Sciencenter projects, the room itself—complete with custom cabinetry and seven large lab tables—was built by volunteers with donations from local companies. *Discovery Space* also has a starlit "sky" created by a local teen as his Eagle Scout project.

A family enjoys the "It's Electric" activities box in Discovery Space. *Photo courtesy the Sciencenter*

Details: Kathleen Krafft, kkrafft@sciencenter.org; *www.sciencenter.org*

ALL ABOUT YOU—Two years ago, the Health Museum of Cleveland closed its doors, sent some well-loved exhibits into storage or out on the road, and set out to reinvent itself. November 8, 2003, marked the gala opening of **HealthSpace Cleveland,** the new incarnation of the nearly 70-year-old Ohio public health and life science museum. Funding for the $28 million building project came from the City of Cleveland, the Cleveland Foundation, and other private and corporate donors.

The 81,000-square-foot building, designed by Cleveland's Bucchieri Architects, has three main sections:

- *The Road to Good Health.* This themed exhibit area introduces health concepts through immersive environments. Visitors are greeted by a third-generation version of an old friend, Juno, the Talking Transparent Woman. Interactive exhibits include Smiles by Cuspid, a dental office where visitors can play at being health professional and patient; Go-Go Grille, a converted lunch wagon that now dispenses information on healthy eating; and Stress Yard, a "construction zone" that illustrates the body's stress reactions and helps visitors learn how to counter them.
- *The Frohring Health Education Center.* The old museum's signature "teaching walls," illustrating human genetics, anatomy, growth and development, and more, have been integrated into classrooms where students can explore and discuss current health issues. The facility includes two state-of-the-art distance learning studios, a pair of life science classrooms with wet labs, a nutrition classroom and demonstration kitchen, a fitness evaluation center, an auditorium, a lunchroom, and Stuffee's Playhouse, a new home for a much-loved exhibit of the past.
- *Head First!* Designed by Jack Rouse Associates, the museum's icon is a

Inside the atrium of HealthSpace Cleveland, the *Head First!* theater communicates the museum's message of personal responsibility for health. *Photo courtesy Jack Rouse Associates*

multimedia theater shaped like a stylized human skull—is clearly visible from the street inside a three-story atrium. Interactive shows in the domed structure feature a "cast" of animated characters engaged in real-life scenarios related to critical health decisions, such as whether to stop smoking. Visitors use touchpads at key points in the narrative to vote on possible story lines. Results of audience decisions are displayed, enabling visitors to see where they fit within the group dynamic.

In addition to its many new features, the museum continues to offer its award-winning *Health on Wheels* and *Workplace Wellness* outreach programs.

Details: Chris Abood, abood@healthspacecleveland.org; *www.healthspacecleveland.org/*

A GREEN LEADER—On January 12, the U.S. Green Building Council awarded its Leadership in Energy and Environmental Design (LEED) "Green Building" Certification to **ECHO at the Leahy Center for Lake Champlain.** The Vermont science center, which opened May 31, 2003, is the first LEED-certified building in the state, and one of only 70 in the United States to receive the rating (see "A Children's Museum Goes Green," *ASTC Dimensions,* November/December 2003).

USGBC recognizes buildings at the Certified, Silver, Gold, and Platinum levels, based on a variety of conservation criteria. ECHO achieved Certified status with a score of 29 points; additional credits were awarded for its state-of-the-art "envelope" of super-efficient windows and insulation.

Formerly the Lake Champlain Basin Science Center and now rebuilt and renamed for U.S. Senator Patrick Leahy, ECHO comprises almost 30,000 square feet of space along the Burlington waterfront. It houses nearly 100 hands-on exhibits, a two-story, 12,000-gallon lake aquarium, and exhibits featuring more than 60 species of fish, amphibians, and reptiles. Visitors can explore a tidepool, observe the lifecycle of an underwater wave, and experience 800 million years of geological time compressed into six minutes. Educators plan to integrate the LEED certification into a guest experience soon.

Located on the shores of Lake Champlain, ECHO at the Leahy Center earned LEED certification for its sustainable building practices and energy efficiency. *Photo by Nick LaVecchia*

Major funders for the $14.5 million project include the federal government, J. Warren and Lois McClure, and additional private donors.

Details: *www.echovermont.org* ■

Grants & Awards

The **Franklin Institute** has received a $60,000 federal Save America's Treasures grant, an award administered by the National Park Service in partnership with several federal agencies to support preservation and conservation of nationally significant intellectual and cultural collections. The Institute's grant will be used to preserve the Wright Brothers' legacy at the Philadelphia museum.

The National Science Foundation has awarded the **Museum of Life and Science,** Durham, North Carolina, $1.6 million over five years for *Mystery Solved,* a mathematics exhibition and companion take-home project that will educate visitors about mathematics through exploration of mysteries and adventures.

The Kiwanis Foundation has presented $165,000 to the **Danville Science Center,** Danville, Virginia. The money will be used to support visiting exhibits and the museum's Butterfly Station and Garden, and to create a telecommunication system between the existing science center and the institution's planned new space in the former Southern Railway Administration Building.

The Connecticut State Bond Commission has authorized a $92 million bond issue for the new **Connecticut Center for Science & Exploration** (CTCSE), scheduled to open in about four years. More than $100 million has now been raised for the $150 million project, for which White Oak Associates is the planner. A private campaign to raise the remainder will soon be launched.

The **Academy of Natural Sciences,** Philadelphia, has received a Challenge Grant from the National Endowment for the Humanities, a U.S. federal agency. The $250,000 grant, which must be matched 3-to-1 by the museum, will provide an endowment to support the Academy Fellow, a position responsible for creating a broad awareness of the role that the Academy and its library have played in the history of science in North America.

People

Cary Sneider, vice president for educator programs at the Museum of Science, Boston, has been awarded a lifetime appointment as an honorary "National Associate" of the National Academies. Sneider has long been associated with the Academies through their chief operating arm, the National Research Council.

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The new president of the Fort Worth Museum of Science and History, in Fort Worth, Texas, is **Van Romans.** A former executive director of cultural affairs for Walt Disney Imagineering, in Glendale, California, Romans replaces **Donald R. Otto,** who retired in March 2003.

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As of January 1, **Hyman Field,** senior advisor for public understanding of research at the National Science Foundation, is taking a year's sabbatical from his post at the Arlington, Virginia, federal agency to work with the American Association for the Advancement of Science, in Washington, D.C. As a senior fellow at AAAS, Field will continued to work on projects related to public understanding of research.

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Mike Maunder is the new director of Fairchild Tropical Garden, Miami, Florida. He replaces **Julia Kornegay,** who left in August 2003 to become chair of the horticulture department at North Carolina State University. Maunder, who also continues in his previous position as director of horticulture for the institution, had been acting director since Kornegay's departure.

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The Science Museum of Minnesota (SMM), in St. Paul, has appointed **Eric J. Jolly** as its new president and CEO. Jolly, who was most recently senior scientist and vice president at Education Development Center, in Newton, Massachusetts, previously served as a senior fellow at the UCLA School of Public Policy, an Osher Fellow at the Exploratorium, and a Kellogg National Leadership Fellow. A widely published author of articles, books, and curricula in the area of science education, he has also had a long association with ASTC, serving as advisor to the *Youth*ALIVE! Initiative and a keynote speaker at the 2002 ASTC Annual Conference. At SMM, Jolly succeeds **James L. Peterson,** who left the museum last August to become president of Gustavus Adolphus College, in St. Peter, Minnesota.

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ASTC recently welcomed two new staff members: **Sheryl Thorpe** is our new assistant manager of Meetings and Conferences, and **Showon Briscoe** joins us as receptionist. ■

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